

## A shot in the dark - guide to cave photography

**A fascinating underground world awaits your discovery. Find out what you need and how to shoot in the dark from a leading cave photographer.**

Words & pictures Peter Jones

Caves are a very fragile and essentially non-renewable resource. While most people would condemn wanton vandalism of caves without hesitation, the destruction of cave resources goes way beyond that. First of all, NEVER touch any cave formations with your hands. Aside from leaving dirt behind on the formation, you also leave oils from your skin as well as skin flakes. Dirt, of course, is the most visible effect, yet the oils and bacteria associated with your skin also change the biological landscape of the cave itself.

Stay on designated trails within the cave if they exist. Most caves are not commercialised, meaning they are not paved and have no electric lights. Nonetheless, there are frequently trails within the cave that are marked by flagging tape or wall constructions. These are not placed here to help you around the cave as much as they are to designate that *'This is where you should walk'* to help protect the cave. This also implies that it is where you should take your photographs from. Being a cave photographer does not give you any rights 'to go where no man has gone before' to paraphrase a famous saying. Keep your camera and your flash units on trail at all times. Finally, do not create images that give tacit approval to people walking on formations or going off trail. Sure, it might make a better shot if your subject is shown leaning against a formation, but that same shot indicates that it is okay for others to do the same. It most certainly is not okay. One person doing so may seem okay to you as photographer, but if a hundred follow in your footsteps the damage can be total and irreversible.



*The Chandelier Ballroom: The most famous room in Lechuguilla Cave in New Mexico, the scene was lit using two bulbs, one from the far left, one in the hands of the subject. The reflective nature of the pure white crystalline gypsum formations bounced the light all around the area.*

### Working in the dark

Cave photography, by its very nature, limits the number of people who are going to try it. You must not be afraid of the dark or be claustrophobic, nor afraid to get dirty. In many caves you must also be proficient as a rock climber and know advanced rope work techniques. These facts of life will filter out about 99% of all people. Without harping on the issue, this is really very good for the sake of the caves, which have a limited carrying capacity.

On top of that is the need for a fair amount of specialised equipment (more on this later). For the moment you should be cognisant that caves can eat camera gear without any trouble. The inherent dirt and humidity can wreak havoc on your best camera. As such, your gear should be rugged and well protected for the cave environment. It's best to leave your high-end electronic camera gear on the surface and dust off that old workhorse mechanical camera you thought you had retired from service long ago.

Doing cave photography is an exercise in frustration. The biggest problem is that you are working in near total darkness and it's this factor that gave rise to my business name, 'Shot in the Dark Cave Photography'. The light on your headlamp is fine for the immediate area you're working in, but it is barely sufficient for dealing with anything other than a small photographic area. Trying to photograph large formations, especially when they are beyond the limits of your headlamp, can be nearly impossible. Composition is based on educated guesswork as much as it is on your headlamp. Focusing can be similarly difficult. Lighting placement may seem easy at first until you get your processed images back and discover the glaringly over or underexposed portions of the photograph. By this time, you're probably miles away from the cave with no intention of returning to it anytime soon. You can understand the frustration.....

## **What gear?**

### **Camera**

Most cave photographers carry around old workhorse cameras of years gone by such as Nikon FEs or Olympus OM-1s. This is not because cave photographers are necessarily cheap. It has more to do with the ruggedness of the camera and its ability to withstand moisture from the cave's high humidity. The advent of all-electronic cameras replacing older models had cave photographers groaning the world over. Unless your camera is sealed in an airtight container with a desiccant inside, the chances are high that it will suffer from the humidity of the cave.

### **Exposure**

In cave photography, there are really only a few shutter speed settings that are important to us - 1/125sec, 1/30sec and the B setting. The only exception is when you're shooting out of the cave entrance and trying to use natural light as part of the image lighting, but that's beyond the scope of this article. The 1/125sec is the fastest shutter speed that most cameras synchronize with flash. In faster speeds, the trailing shutter leaf already starts to close before the leading leaf has made its way across. As such, you will find yourself with only half an image. 1/125sec works fine when using flashguns (Strobes in the US) since it is usually enough to freeze motion of someone walking by with a cap lamp on (slower speeds will lead to a glow worm image on the photo) while the flash's duration is measured around 1/30,000sec.

1/30sec is used when working with flashbulbs (yes, cave photographers use flashbulbs a lot!) Flashbulbs, while considered by many to be an archaic lighting system, are great for cave photo work for many reasons (covered later). A flashbulb is a filament that must burn up to give off its light. Usually 1/30sec is required for the filament to burn up completely, garnering the most light from it. Faster speeds are a waste of the bulb's lighting potential.

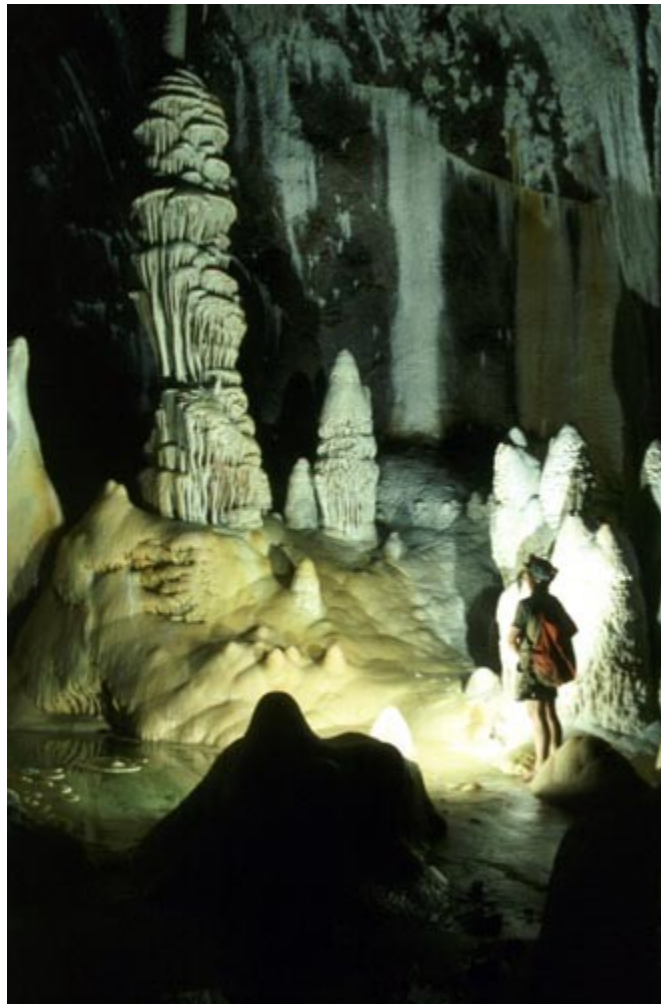
The B-setting is not used as frequently as the above two, yet it still has applications in cave photo work. Painting with light is one technique. In this, you walk around a cave room popping off your flash in different locations to build up the lighting. The B-setting can also be used for other techniques such as manually firing different flashes when slave units aren't available. Long duration exposures of dim lighting are also possible with a B-setting.

### **Film**

The choice is subjective and everyone has a favourite to work with. For years, mine was Kodachrome. It has a warmth that other films didn't have and has good archival quality, but I have since been leaning more towards some of the Fuji films such as Sensia and Provia F. Provia can be pushed up to three f-stops, though I've never needed to go more than one stop. I've tried some of the Ektachrome Elite series, such as the saturated and warm-saturated versions.

As you can tell, I like using slide film and rarely use print film, even though it is much more forgiving of the high contrast of cave photography. Perhaps as I move more into doing prints for sale I'll try working with this type of film, but for the moment, I won't use colour or black & white print film.

In all cases I have found, as most cave photographers have, that a moderate ISO 200 speed film is about right for underground work. Slower speeds limit your capability with the light sources you carry, faster speeds give you more of a problem with contrast and graininess.



*The Pearlsian Gulf: A single flash bare bulb. The reflection from the pool and surrounding light coloured formations lit up the entire area.*

### **Lighting**

Without question, lighting is the single most important aspect of cave photography. Not only is the amount of light a consideration, but also the source, direction and number of lights. You can only get away without using your own lights if you are using natural sunlight in the entrance or are photographing in an electrically lit commercial cave, and both these sources have their own set of problems.

Cave photographers mostly use flashguns as their primary light, followed by bulbs as their second main source. Each have their own advantages and disadvantages. Flashguns are fairly inexpensive, are dependable and put out sufficient light for most work. The most commonly used are the Vivitar 283 or 285 and the Sunpak 433 series. These have a fairly good guide number and you can adjust the manual power output on them to save battery life. I also use a series of smaller guns that I've picked up on the used camera market for fill lights and close-up work. In addition, flashguns recharge themselves and can be used for multiple shots without having to adjust them between each shot.

Bulbs of all shapes and sizes are still used a lot by cave photographers. There are several reasons why they have not been totally replaced by the use of flashguns - they have a higher light output than many strobes. When photographing a large room, nothing beats the output of a flashbulb. They also give off a wider arc of light than a strobe. The light output of most flashguns is a fairly narrow beam whereas a bulb can send out its light 180 degrees (or even 360 if you leave the folding fan down). This is advantageous in certain situations. Finally, the light output is slower which can give you a softer appearance if shooting running water underground. The disadvantages are that they are a finite resource (they stopped manufacturing them years ago) and the bulbs must be replaced manually between each shot, a pain in multiple exposures for f-stop bracketing. You must also have a unit to fire the bulbs. Honeywell Tilt-a-Mites are the acknowledged best unit available.

### **Accessories**

Certain accessories are almost a necessity for serious cave photo work. A tripod with a good ball & socket head and cable release is very valuable for any number of reasons. Even more important, and virtually indispensable, are slave units. Slaves are remote electronic switches that you attach to each of the different flash units distributed around your cave photo area. The flash on your camera sends out the message to all the slaves to fire when your camera shutter opens. In this way, they are all synchronized and give you the perfect exposure. This also helps to eliminate the need for tripod. Certain slaves are far better than others and the caveat 'you get what you pay for' holds very true in this case. Stay away from the cheaper slaves as they will not work well underground. The Wein SSL slaves are decent for cave photo work, the Firefly Slaves for cave photography are by far the best (and less expensive to boot)

## Shooting in the dark

All the equipment in the world won't necessarily make you a good photographer and this certainly holds true even more so underground. Even Ansel Adams, one of the finest photographers in the world, tried photographing in Carlsbad Cavern in New Mexico only once and had some pretty dismal results. Like any other form of creative expression, it takes time, patience, perseverance and a bit of good luck to learn and grow from experience. As such, I would suggest starting small without great expectations and moving forward from there.

If you learn nothing else from this article, learn this: Your on-camera flash is useless for nearly any cave photo work except to use as a trigger for your other flash/slave units. Most on-camera flashes are designed to be used in small areas where there are reflective surfaces to bounce the light around. At best, they are good for fill light. If you've ever looked at the specs on it, most likely the flash has a guide number of 30 (ISO 100/ft). This makes it nearly useless for anything but close-in work. A cave, except in rare occasions where the walls are white, will eat up your light. In fact, most cave photographers wind up doing testing on their flashes to learn what the 'cave guide number' is. It is surprisingly low. A Vivitar 283, which is supposed to have a GN of 200, has a cave GN of only 110, nearly two full f-stops of difference.

The second reason for not depending on your on-camera flash for lighting is that it gives the most flat, lifeless image you can imagine. Aside from causing the ubiquitous red-eye in your human subjects, the image won't show any of the wonderful subtleties of shape, shadow and character that your eye sees yet the camera doesn't. In a single sentence, 'get your flash off the camera!'

Single flashguns can still be used with great success. If you simply move it off to the side only a few feet from the film plane, the results will dramatically improve. This is because you are creating shadow and therefore texture and a sense of three-dimensionality, all of which make your image more pleasing to the eye. You can use a cable that comes with the flash to attach directly to the camera or use a slave unit to trigger the flash remotely.



*The Light Within: A single slaved strobe from behind backlit this small, delicate helictite. The translucency of the formation was used to advantage.*

This is a time to mention bracketing your exposures. No matter how good a cave photographer you become, you will never have a single shot that gets the lighting correctly the first time. There are too many variables in each and every shot to know what is best. As such, bracket your shots in half f-stops for at least a full stop on either side of what you think intuitively is correct. To begin with, you'll want to even consider up to two stops, leaning mostly toward overexposing rather than underexposing. You'll be surprised how your first few images turn out. Believe me, the cost of film is nothing compared to the expense and labour of taking the image underground.



Experimentation in using a single flash is well worth the effort. If you tried moving the flash off camera to the right, now try it to the left of the subject. If using a slave, move it 90 degrees to the right or left for a strong sidelighting. Now try it behind and below the subject or directly overhead. There is no one correct way in which to light the image, only variations that give you different results. Your creativity can run wild underground!



*Ice in the Bay: One single flash from overhead. Of all the lighting angles used to take this shot, this was by far the most dramatic. The white floor that this formation grew on bounced the light back up from below and acted as a softbox in itself. The dark background sets off the formation and shows the delicacy of it.*

If you have the equipment, capability and time you can try adding a second flash. This can dramatically change your images. Note I didn't say 'improve' your images as single flash shots can be very dramatic without the addition of a second flash. However in some cases the addition of a second source of light will help to 'bring out' the photograph.

The second light can be used as a fill light of lesser power or be used at equal power to help evenly illuminate the subject. Experimentation is a necessity. A dramatic effect can be created by strongly backlighting a subject (along with a properly lit foreground) such that the backlight creates a slightly burned edge to offset it from the darker background. Try putting a light on either side of a subject with the lights aimed at one another.

With time and knowledge, you can add more lights as the image warrants. Sometimes a couple of strong lights can be used to evenly illuminate the scene and a smaller light can be used to bring out (and thus draw your eye to) a human subject within the frame.

In all cases you must remember that you are providing all the lighting for the image. There is no ambient light to take care of areas that you don't put a light on. If it ain't there, it ain't gonna show up on the photo! This can be most frustrating when you get your processed film back and realise that you failed to light up one small area that now stands out as a glowering black hole. Sorry, there's just no way around it!



*Lake of the Lost Marbles: One flash from camera, one flash in subject's hands. The narrow alcove bounced the light all around.*

### **Instant images**

For years cave photographers depended on their own intuition derived from boxes and boxes of failed photographs to learn how to light their images. Some photographers used a technique called 'mental Polaroids' to preview their shot. This is a method whereby you close your eyes for about ten seconds before taking a shot, open them just before firing the flashes, then closing your eyes again quickly. There is a slight bluish-purple after-image that remains on your retina for about five seconds after the flashes go off. While you might not see the finer details, you can definitely tell if there is an over or underexposed part of your set-up that needs attention. It's not perfect but it has saved many a photo set-up for me.

A step up from that is the use of Polaroid camera or back for your main camera. Once you've set up your shot intuitively, you can take a Polaroid shot and see the results in advance of using your regular film. This has some drawbacks, however. Your Polaroid camera must have a shutter speed and aperture adjustment on them, precluding the use of cheaper versions. Your film speed and format may not match that of your regular film and camera. If you are using a back, you run the serious risk of introducing dirt and moisture into the camera itself, something to avoid at all costs. I wound up using an old Polaroid camera that had been factory-converted using a Rodenstock lens/shutter assembly. It worked reasonably well for a number of years and despite its drawbacks, it saved a number of shots that might otherwise have been failures. Live and learn!

The arrival of digital cameras over the past few years has helped to change the future for cave photographers everywhere. Within the past year, I bit the bullet and purchased a Nikon Coolpix 990 digital camera for my photo work. It has nearly changed my life for the better.

I purchased it because it was one of the few that allowed me complete and independent control of the shutter speed and aperture, a necessity for serious cave photo work. It also allows adjustments for the equivalencies of your film's ISO speed. There are numerous other features about the camera that are great for my type of usage that have only recently become evident.

In any case, the first and biggest advantage is the ability to use it as a Polaroid type camera. By setting the camera on manual control, adjusting the ISO equivalent and adjusting the shutter and aperture, I am able to take a photo and see exactly what it will look like when taken on my film camera. I can then make adjustments to the lighting, take the shot again in a higher resolution (to retain) and finally, bring out the film camera and take the shot knowing that it will be right on the money.

The possibilities are now nearly limitless for me.  
No longer do I have to wait to see what the results will be like.  
I can tell as soon as I take the shot what they will be.  
As such, the only limitations now are my own creativity and imagination.

When using the digital camera it is imperative that I use the on-camera flash as the trigger for all the slaved light sources.

In fact, to make sure that my subjects don't suffer from red-eye, I actually place a wide rubber band over the flash tube. Since the Firefly slaves that I use respond to small but sudden changes in the infrared light levels (making it ideal for cave photo work), the small amount of IR light that passes through the band or around the edges of it is sufficient to trigger the slaves. Since virtually no visible light is coming from the on-camera flash, it does not noticeably affect the photo.

### **Some things to try out**

This article assumes you have a solid background in basic photography skills. If you are not familiar with the use of strobes/flashguns and how to use guide numbers for proper exposure, you should research this first as it's critical to know how to adjust your f-stop based on the flash system you are using.

Assuming you have learned that, here are a few things to try:

**1** Cave photography is not just about taking pictures of pretty formations; far from it. Passage shapes in cross section can be just as interesting. Think about using the shape of the passage or the array of formations as a way to frame the subject in your photo. Use the 'rule of thirds' in your composition.

**2** Use your lighting creatively. Illuminating your subject from behind while they stand in the passage can create a very dramatic effect. Sometimes the overexposed light from behind in the narrow passage can reflect back on the face of the subject and properly illuminate them in the front. Similarly, using a strong light on the side of a subject, causing a bit of a burnout right on the edge, can create a very dynamic edge when presented against a dark background such as you find in a cave.



*Hidden Passage: The caver is strongly backlit by the hidden flash behind him. In addition, a strobe lit up the overhead formations and a smaller strobe lit up the subject.*

**3** Use your larger lights to create the overall lighting in the scene you are shooting, but use smaller flashes to highlight areas that are important. As Ansel Adams is said to have done in his prints, he lightened the area that he wanted the eye drawn to and intentionally darkened the area around it to force the eye to the centre of attention. Clearly you have this option in cave photography. Use it to your advantage.



**4** While a few people seem not to like seeing people in bright coloured clothing in caving situations, the fact remains that brighter colours draw the eye. A dark, dirty caving suit does little to draw attention.

**5** In close-up shots, the use of a softened light (soft box or even just a piece of tissue over the flash tube) is frequently better than a hard light. Sometimes the cave passage itself, if it is reflective, can serve as a bit of soft box on its own.

**6** Use flashbulbs for photographing water scenes. Because they have a longer burn time (about 1/30sec), they will soften the effect of falling/moving water. A strobe will absolutely freeze the motion of the water in a not too flattering manner. The slight blurring of the motion by use of a bulb gives it a softer, more water-like appearance. Similarly, bulbs can be fired off underwater using the proper flashgun system. The water is wonderful at dispersing the light and creating a very dramatic effect.

**7** Large room shots can require a lot of light. This usually means several flashguns and bulbs all synchronized using slaves. Sometimes it's best to aim the lights not at specific targets (like formations in particular) but in the general area. Too much light on one specific target can create an unnatural appearance. If using multiple lights from different areas, the overlapping of lighting can give you a better evenness of lighting. If you want to put more light on one specific area, add a smaller flash in that area to highlight it. This is better than leaving some areas totally dark when the eye would prefer to see the overall area evenly lit.

**8** Conversely, at times it is best to remember that you are photographing in a cave, which is naturally dark. It can be entirely appropriate to leave passage that goes into the distance as a dark, beckoning area. If anything, this type of photo can be more inviting and intriguing, causing the viewer to ask, even if subconsciously, 'I wonder where that area goes to?' That, after all, is what intrigues a lot of people about caves from the start!

**9** Photos of people doing things that cavers do can be exciting. The static pose of people standing and staring at a formation is less than interesting to most people. Movement is much more exciting to view. It can be difficult to achieve, but even if a person looks like they are walking forward or using some of their rope work gear, the effect can be much better. Try shooting people in the water, wading or swimming.



*Into the Jagged Canyon: The extreme reflective nature of the surrounding aragonite crystals was used to advantage in this photo. It was lit by a single flash from the lower right, just out of line of sight over the horizon from the camera.*

**10** The final reminder once again is that you must be extremely careful in your activities within the cave. Do not touch or walk on formations or clean areas that are off trail. Just because you are a photographer gives you no special privileges that everyone else doesn't have. And remember that your photos can and will have a lasting effect on how people view a cave. Their view should be that caves are a fragile, non-renewable beautiful world that only a few will ever get to see. As such, the caves deserve all the protection and care they can get and it is up to you bring that information to them through your photos and the way you present them.

Please, be careful in the caves we all love so much!

#### **For more info**

The subject requires a book's worth of information in order to learn the proper techniques for successful cave photography and fortunately there are several excellent books available for those wanting to delve into it further. The current bible of cave photography is entitled 'Images Below' and is written by Chris Howes, an acknowledged master of cave photographic technique. A second book which is about to be published by the National Speleological Society is entitled 'On Film' and is a group effort by several of the top cave photographers in the US. I have several chapters in the book as well as a handful of photos. Each chapter is written by a different photographer and there are a variety of



excellent techniques discussed. The book will be published before the end of 2001.

Should you decide to take a more active approach to cave photography (and thus, caving), I suggest that you contact the National Speleological Society as the best place to start. The NSS is the world's largest organization dedicated to the exploration, study and conservation of caves. The NSS can direct you to a more local group of experienced cavers who will help you in your endeavours and 'teach you the ropes' both literally and figuratively. It is simply the way to do it properly. Find the NSS at <http://www.caves.org/>.

#### **About the author**

Peter Jones has been a cave photographer since 1969 and has worked as a still photographer and film assistant for National Geographic Television; coordinator and still photographer for NOVA; assistant and still photographer for The Learning Channel and chairman of the NSS photo section.

He has also coordinated and been expedition leader of numerous trips into Lechuguilla Cave, Carlsbad Caverns National Park, New Mexico

Peter's photographs have been exhibited in numerous museums around the world and appeared in various publications including: numerous covers of the NSS News, monthly publication of the NSS, Deep Secrets, the exploration of Lechuguilla Cave, Carlsbad, On Rope II, Lechuguilla, Jewel of the Underground, Cigar Aficionado Magazine, Caving Adventures, Capstone Press  
numerous cards and posters and Impact Promotions for National Geographic.

For further information on cave photography equipment and technique, feel free to contact Peter at [pjcaver@zwi.net](mailto:pjcaver@zwi.net) or by phone on 207-236-6112.

Peter Jones Shot in the Dark Cave Photography, 80 Mountain St Camden, Maine 04843 USA.

If you are interested in cave photography in the UK visit- <http://www.caves.org.uk/photography/> and for general info about caving go to <http://www.caves.org.uk/>.